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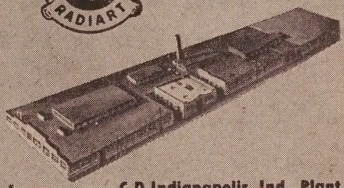

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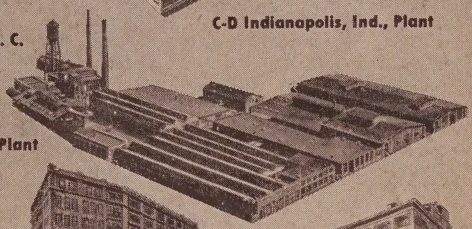

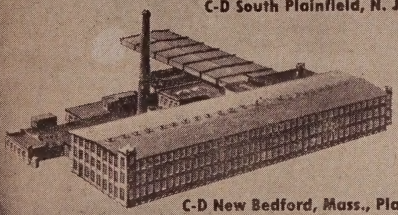

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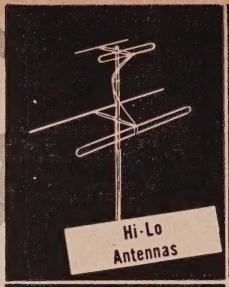

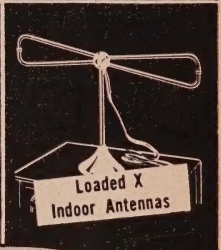

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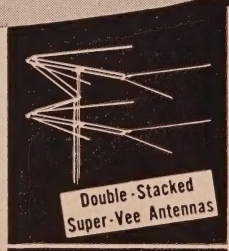

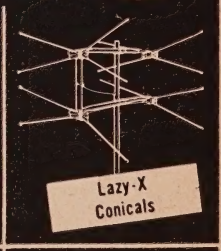

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VOLTAGE REGULATION IN HIGH-VOLTAGE POWER SUPPLIES

Voltage regulated d. c. power supplies, and the principles of voltage regulation, are now so commonplace as to be well-known to electronic technicians in all categories. Most ordinary experience with stabilized power supplies, however, is in the range between 200 and 500 volts. Few technicians have had occasion to extend their thinking to include the regulation of high d. c. potentials. There accordingly is some question as to what course to take when the problem of how to regulate a high-voltage d. c. power supply arises.

Actually, the circuits for high-voltage regulation differ from those employed at low voltages only in the size (and sometimes the number) of components. It is comparatively easy to stabilize high potentials, and the obvious advantages of a steady output voltage should not be overlooked in the design of high-voltage power supplies. Several common circuits are available and will prove effective. The one selected for use will be governed by individual requirements as to voltage output, percent regulation desired, output current, and required simplicity.

Among the better-known circuits is the conventional electronic voltage regulator shown in Figure 1. This circuit has been adapted for high voltage by

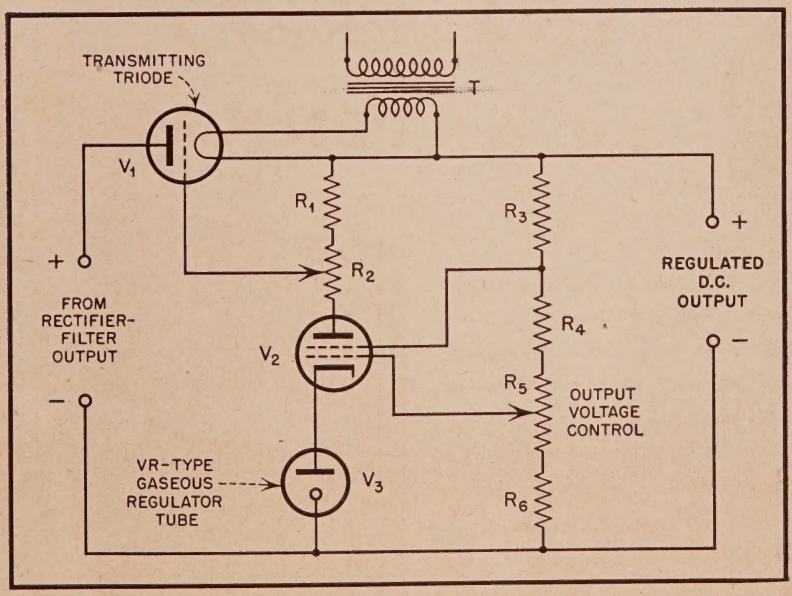

Fig. 1. Electronic H.V. Regulator.

employing a high-voltage triode at V_1 and by properly proportioning resistors R_1 to R_6.

Operation of this circuit is explained in the following manner: The entire output current passing from the rectifier-filter circuit to the external load must pass through V_1. This tube is made to act like a variable resistor by varying the d. c. bias voltage applied to its control grid. If the grid is made more negative, the output current is decreased; if more positive (less negative), the output current increases. If the grid bias of V_1 can be made to vary in proportion, but in opposite direction to output voltage variations, then the variations effectively can be cancelled out. This action is exactly what is accomplished through the medium of V_2.

For illustration, consider an increase in output voltage across the two REGULATED D. C. OUTPUT terminals. The voltage at the control grid of V_2 rises in proportion. This increase in positive bias causes V_2 to draw more plate current through resistors R_1 and R_2 in series, thereby making the grid of V_1 more negative. The increased negative bias reduces the current passing through V_1 and consequently reduces the voltage at the REGULATED D. C. OUTPUT terminals. The opposite effects take place when the d. c. output voltage decreases. The net result is to iron out automatically variations in the output voltage.

Triode V_1 must be rated to withstand the high plate-to-cathode voltage which will be encountered in a high-voltage power supply. This calls for a transmitting-type tube. Most transmitting tubes have filament-type cathodes, necessitating use of a filament transformer, T. This latter component must be insulated to withstand the applied d. c. voltage. Tube V_2 also should be rated to withstand a higher value of plate-to-cathode voltage than is common to the small pentodes used in this position in low-voltage regulated power supplies. Types 6L6 and 807 are satisfactory.

Resistors R_1 and R_2 must be selected so that the resistance of the two in series will limit the plate current of V_2 to the maximum safe operating value specified by the tube manufacturer. R_2 is made variable, in order to adjust the initial bias voltage on V_1 to a value which will give the desired degree of output-voltage regulation. The total resistance of the string including R_3 to R_6 must be high enough to limit the bleeder current to a few milliamperes. The ratio of these resistors must be chosen to give the rated screen voltage for V_2 at the junction of R_3 and R_4. Potentiometer R_5 permits adjustment of the output voltage over a range of regulated d. c. values. R_4 and R_6 limit the range of this potentiometer. V_3 is a gaseous-type regulator tube (OC3 or OD3) used as a voltage reference device to cathode-bias V_2.

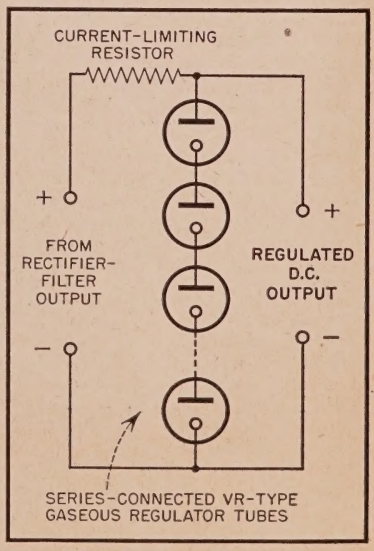

Fig. 2. Series-Connected Gaseous-Tube H.V. Regulator.

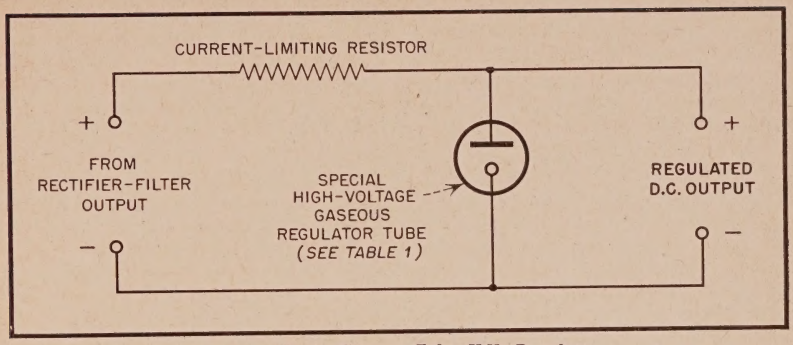

Fig. 3. Single Gaseous-Tube H.V. Regulator.

The electronic regulator will stabilize d. c. output voltages up to several kilovolts. For higher output currents than the maximum safe operating current of V_1, several similar triodes may be connected in parallel. Regulation can be obtained as close as 1 percent.

Figure 2 shows a simpler high-voltage regulator circuit employing a string of series-connected gaseous regulator tubes. Either OC3 (105 v.) or OD3 (150 v.) tubes may be used. The sum of the voltage drops across individual regulator tubes must equal the desired regulated output voltage. For example, 10 Type OD3 tubes would be used for 1500 volts; 10 OC3 tubes for 1050 v. Some designers favor the connection of a 0.5-megohm resistor across each tube in the series string.

The rectifier-filter d. c. output voltage must be at least 1.3 times the total voltage of the regulator-tube string, in order initially to fire the tubes. The current-limiting resistor must be proportioned to pass 40 milliamperes through the tubes in the absence of any external loading. Expected regulation provided by this circuit is of the order of 5 percent. Output current variations can fluctuate between zero and 35 milliamperes.

When lower values of output current are required, special *single* regulator tubes are available for use in the circuit given in Figure 3. This circuit is similar in action to the one shown in Figure 2, and will be recognized as the basic gaseous-tube regulator circuit. Table 1 lists operating characteristics of special regulator tubes useful in the circuit of Figure 3. These tubes

TABLE I.

Type	Min. Starting Voltage Supply (approx.)	Operating Voltage (approx.)	Min. Operating Current (m.a.)	Max. Operating Current (m.a.)	Max. Regulation (volts)
CK1017	800	700	0.005	0.055	20
CK1022	1100	1000	0.005	0.055	20
CK5962	730	700	0.002	0.055	15

are invaluable for the simple regulation of high-voltage, low-current devices such as Geiger counters.

Two greatly simplified and compact regulators are shown in Figure 4. These circuits utilize the non-linear conduction properties of Thyrite resistors (a General Electric product) marked T in the diagrams. The characteristic curve of a Thyrite resistor is such that the voltage drop across the resistor changes only slightly although current passing through the resistor changes many times. A regulated voltage accordingly may be taken from across a Thyrite resistor in series with a conventional resistor (See Figure 4A), while the supply voltage may be fluctuating. Regulation percentage increases when the Thyrite current is large as compared with the load current.

A Thyrite bridge is shown in Figure 4(B). In this circuit; as the rectifier-filter output (bridge input) voltage increases, the bridge output voltage also increases up to a maximum value. If the input voltage is increased beyond this point, the output voltage will return to zero. If the input voltage is increased still further, the output voltage will increase to a maximum value in the opposite direction (output polarity change). If the bridge is operated near the first maximum, good output-voltage regulation will be obtained in the presence of rather wide supply voltage variations. A slight disadvantage of the bridge is the fact that it will not permit a common input and output ground connection.

From the foregoing explanation, it is seen that the Thyrite type of high-voltage regulator is a more effective stabilizer of supply-voltage variations than of load fluctuations.

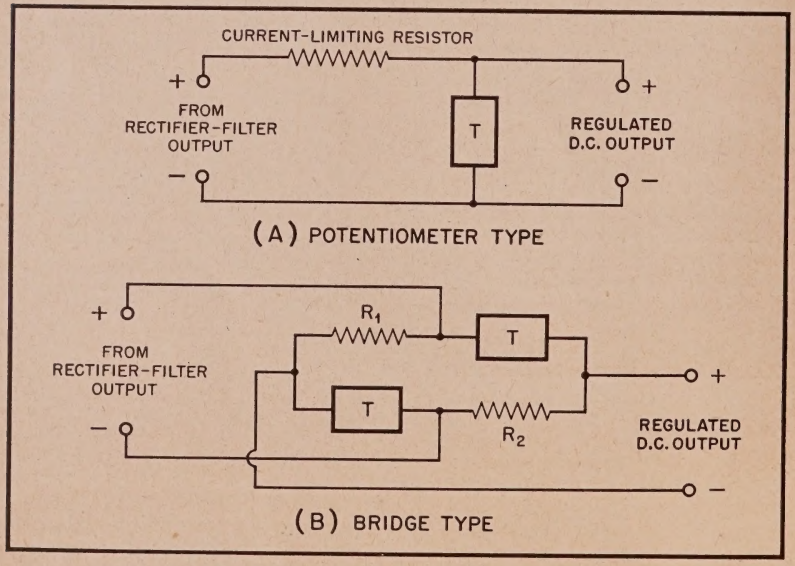

Fig. 4. Thyrite H.V. Regulators.

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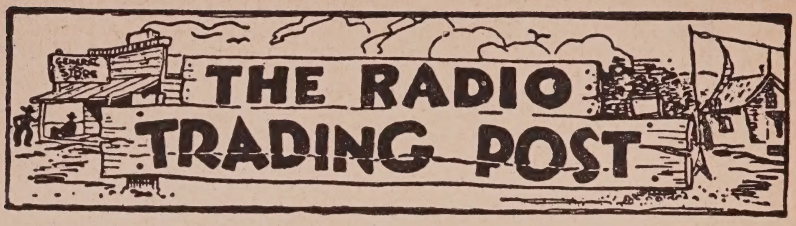

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ERRATUM

Subject: "SUPERSENSITIVE SIGNAL TRACER FOR RADIO & TV"
February, 1952, issue of "The Capacitor"

Circuit diagram, Page 5 — A 0.1 ufd. capacitor should be inserted between jack J_2 and the junction of C_8 and R_7. This capacitor was omitted from the circuit diagram. This capcitor will serve to prevent the application of d.c. voltage on the grid of the 6C4 tube when checking signals at d.c. points.

The Editor.

TRADE—Collins 75A-2 with matching speaker, 3 wks. old, orig. cartons. Will trade for '47-'48 Chev. or Ford, A-1, club coupe pref. Advise cash additional. Going south. J. A. Meade, 2937 Far Rockaway Blvd., Far Rockaway, N. Y.

FOR SALE—NRI prof. sig. gen. fundamentals, 170 kcs to 60 mcs, like new $35. Rider TV man., like new, no. 5 $15; NRI VTVM tester, in case $5. Clarence E. Zink, National Radio Service, Elmhurst, Ill.

TRADE—Brush Soundmirror tape recorder for 2¼ x 3¼ camera, f45 lens, 8mm movie camera and old type RCA wire recorder. Gerald A. Warner, 71 Milford Ave., Newark 8, N. J.

SALE OR SWAP—25 cycle 110V motors, ¼ hp $10; ½ hp $25; car radios $10. Block's Electric Shop, Hartwick, N. Y.

FOR SALE—Precision 844P multimeter, with test leads in very good cond. Make cash offer. Joseph A. Mimm, 2016 Loubat St., Apt. C, New Orleans 21, La.

FOR SALE OR SWAP—12" coaxial speaker, orig. cost $34.95. Want $20 or will trade for SCR-522 or 813s. Anthony Faiola, 341 Stanley Ave., Mamaroneck, N. Y.

TRADE—Federal dual speed recorder, orig. cost $550, trade for a TV set, tape recorder, small metal lathe, table saw, jig saw. Have radios, record players, RCA comm. rec., test eqpt. Fred Dillion, 1224 N. Horne Ave., Los Angeles 46, Calif., Dept. CD.

FOR SALE—Superior Powerstat Type 216-U, 230V, 810VA., like new, $12.50 FOB. Arthur Koehler, 130 Wadsworth Ave., New York 33, N. Y.

SWAP—J. C. Higgins 12 gauge repeater shotgun, fired less than 50 times. With gun cleaning kit; value $35. Want VTVM or scope. Willis Connor, 214 Vine Ave., Park Ridge, Ill.

FOR SALE—Decca PA system and record player, mod. 10 comp. with mike, in luggage type carrying case, 110V 60 cycle AC only $50. John W. White, 403 Sterling Ave., Winona, Miss.

FOR SALE—15" and 19" round picture-tubes, Pilotuner, Regal two stage TV push-pull booster, all like new. Any reasonable cash offer, locals only. W. A. Toepel, 99-54 64th Rd., Forest Hills 74, N. Y.

FOR SALE—BC-221-T freq. meter with cal. book, built-in power supply, audio amplifier and speaker $65; Heathkit sig. gen. with cal. National dial $20; Heathkit sweep gen., needs calibration $25; EICO scope $35. E. F. Dertinger, 111 Greenridge Rd., Baltimore 4, Md.

SWAP—Simpson VTVM; Supreme tube tester; RCP voltmeter; also guns. Want key machine, duplicating or code type machines and code books. W. H. Norman, 112 Douglas Ave., Rockwood, Tenn.

FOR SALE—Appliance store handling small appliances, radios, and TV; over $20,000 gross in 1951. One of best equipped, largest radio and TV repair shops in county. Will give details in letter. Total price $5500. J. H. Wyatt Radio Service Co., Searcy, Ark.

FOR SALE—Due to death of my husband, am selling BC610-C transmitter comp. with BC614-C speech amp., tubes and coils for 10, 20, 40 and 80 meters, also other eqpt. Mrs. Gabriel Uljon, Windfall Rd., St. Mary's, Pa.

WANTED—Slide rule. State make and scales. Also late ed. Machinery Handbook. Earl Russell, Colfax, Ill.

SERVICES—Test instrument kits assembled $5 any kit except oscilloscope $10. Have kit sent to me. Inspect assembled instrument before you pay me. C. W. Chastain, 228 Timber Lane, Memphis 12, Tenn.

SALE OR SWAP—Phono. osc., '46 Ford auto radio, corr. course, radio parts, meters for U. S. stamp collections and test eqpt. Merle W. Crabb, Vestal, N. Y.

SWAP—NRI transmitter, modulator, mike, power supply, metered, like new; 3-543, 6SN7, 3-6J5-2-6V6, 2C34 final. For good audio amp. or? Prefer local swap. Frank K. Smith, Spring Mount, Pa.

SWAP—NRI radio-TV servicing course and/or NRI serv. man. vol. 1, cont. diagrams of rec's built prior to 1946 for 35 mm or press camera. Max Paschke, 401 S. 3rd, Grand Forks, N. Dak.

FOR SALE—Jackson TVG-2 sig. gen and CRO-2 oscilloscope with diode probe all for $400; Jackson 641-A sig. gen., works with scope, $140; Jackson 645VTVM and high voltage probe $50; Rider 1-5, 6-20 $150; Sams Photofacts 101-144 $50. Frank C. Barney, Weir, Kans.

FOR SALE—RCA no. 155A 3" scope $35; Dumont no. 275 5" scope $85; RCA volt-ohmyst no. WV-97-A, $55; 400 ft. Amphenol no. 14-271 tubular 300 line, 6c per ft. Postage extra. Horace D. Westbrooks, Box 281, Griffin, Ga.

FOR SALE—Mallory inductuner, orig. tenturn $10; UTC hi-fi output xfmr, LS-61, like new $16; National PW-4 precision 4-gang 222 uuf cond. with micrometer dial, like new $18. O. L. Updike, Jr., 1848 Winston Rd., Charlottesville, Va.

FOR SALE—RCA 630TS TV set comp. with cabinet, exc. cond. $70. Will not ship, must be called for. Thomas Hanawa, 24 Grant St., Newark 2, N. J.

SELL OR TRADE—EMC tube-ohm-capacity tester, mod. 202; antenna rotor, like new; grid-dip oscillator; NRI comm. course, tester, transmitter; Supreme Audolyzer, mod. 562. Need VTVM and ATR. J. Ryan, 149 W. Lehigh Ave., Phila. 33, Pa.

WANTED—Wm. B. Duck and Electro Importing Co. catalogs of about 1920; De Forest unit rec's. consisting of 15 interpanels, 3 honeycomb coil tuning unit, variable cond's., switches, rheostats and audio units mfd. about 1920; also double secondary loosecoupler. Glen Angle, Clear Lake, S. Dak.

FOR SALE OR TRADE—Test eqpt., tubes, and parts for Radio-TV repair shop, $268 cash or will trade for equip. in ham gear. Send for inventory list. Oliver Pinkerton, 376 E. Ohio Av., Sebring, O.

TRADE—Either Perfex 35mm or Eastman 4 x 5 camera with all acc. for wire or tape recorder. Also want Zenith mod. 52 chassis with speaker. Larson's Radio Service, Madison, Minn.

FOR SALE—Jensen 12" PM speaker with matching transformer, baffle and toggle switch, used about 12 hrs. Impedance values on trans. are 500, 1000, 1500 and 2000 ohms, $16. Peter Danko, 308 Lincoln Ave., Mingo Jct., Ohio.

SALE OR TRADE—3200V. C.T., 500 ma. transformer, 15 henry, 500 ma. choke, 2000V. unfiltered power supply. Want mobile eqpt. D. W. Crupi, Box 202, Wrightstown, N. J.

WANTED—Hallicrafters SX-42 and R-42 speaker, W. H. Oldendorf, Lt. (jg), MC USNR, 134A Lexington St., Middletown, R. I.

FOR SALE—Precision E-400 sweep gen. $85; Precision ES-500 oscillograph $100; slightly used, 1 yr. old, comp., all cables and inst. books. Both units $175 FOB. Howard W. Benz Radio and Television Service, 1946 Noble Rd., Cleveland 12, Ohio.

FOR SALE—All ham gear; Hallicrafters SX28A with matching speaker $125. Many other bargains; card brings list. G. J. Tanguay, 505 Vine St., Liverpool, N. Y.

SELL OR SWAP—Radar transmitter and rec. BC 1267-A 154-186MC, 28 tubes plus companion power supply and instr. book. Want transmitter, comm. rec., BC221. Jim Hill, Box 373, Cary Hall, Lafayette, Ind.

FOR SALE—Magazine subscriptions for electronic, radio, TV servicemen and students. Many others, fair prices. James A. Smith, Oakwood Rd., Rt. 2, Gainesville, Ga.

SELL OR SWAP—NRI comm. course; also NRI electronic multitester with RF head and batteries. Best offer. Bob Bair, Rt. 1, Box 1089, Hood River, Ore.

WANTED—10 meter beam, 3 or 4 element. Also motor to operate beam; must be in good cond. Paul Kuzmak, 67 Buckland Rd., Wethersfield 9, Conn.

SELL OR TRADE—Speech amp. $19; QST Jan. '25 through Dec. '45 $25. Final class C amp. kit 400 to 600W with choice of 5 prs. of tubes $27 to $36; National NPO dial $6.50. M. Lawson, 4010 River Dr., Houston 17, Tex.

FOR SALE—Markel duo playmaster record player mod. 71; plays both sides, 1 side or man., single speed; used only a few hours. Cost $68 wholesale, $24.50 FOB. M. A. Porter, 1709 N. Larrabee St., Chicago 14, Ill.

SALE—GE ST4A TV sweep gen. and GE ST5A TV marker, with all cables and instruc. mans.; cost $850, sac. $500 FOB. Paul Kandel, 535 N. 8th St., Phila. 23, Pa.

WANTED—Instruction manual for BC-348-M rec. W. F. Montgomery, Jr., 3958 Baltic St., Jacksonville 5, Fla.

SWAP—Jap Samurai swords, meters, CRT's, artillery scope Philco 10" TV set, German welder, vibroplex bug, 18W terminal amp., Weston 697 analyzer. Want scope, impedance bridge, voltohmyst, CREI course, comm. rec. G. J. Wendelken, 201 W. 109th St., New York, N. Y.

FOR SALE—Hickok no. 156 traceometer; Hickok no. 288X sig. gen. and Hickok no. 532 tube tester, all in A-1 cond. $250, or $85 each. Paul Miethke, 8870 Santa Monica Blvd., Los Angeles 46, Calif.

SALE—Capehart automatic record changer, as used in $1400 comb.; plays both sides of 10" or 12" records automatically $50. Louis Deutsch, 606 E. Anchor Street, Philadelphia 20, Pa.

FOR SALE—15 mfd 2000V. cond. for photoflash and Strobe light units $4.50; Anglo photoflash lamps, 10,000 flashes per bulb, original cost $14.70, $5.95. William Berman, 1188 Broadway, Brooklyn 21, N. Y.

SWAP—Meters, DC and RF; 6V. V1B packs; 6SN7, 5U4 and battery type tubes; fishing tackle. Want Silver no. 915 grid dip adapter; adj. isolation transformer; 35mm camera; tubes and 16mm sound projector. Frank Popma, Orange City, Iowa.

FOR SALE—Weston Analyzer 665, AC-DC, volts 1.0 to 1000; resistance 1.0 to 500 and 0 to 10 mfds; multiplied 10-100-1000, like new, comp. parts, needs wiring $20. Ted Solarz, 3033 S. Pulaski Rd., Chicago 23, Ill.

FOR SALE—1951 Neptune 5hp outboard, $20 repair parts kit, 1951 8 ft. Aeromariner plastic boat, auto carrier, and other access., all for $240; used only few times; cost over $300. R. L. Firmature, P.O. Box 528, Lake Charles, La.

FOR SALE—Heathkit scope $40; RCA voltohmyst, prewar, $35; BC312-M, conv. to AC $60; Jensen 15" coax. $15; transf. 725-0-725 @ 550 ma $7.50; standard coil TV tuner $10.25; BC458-A $5. Andrew F. Deming, Rt. 1, Alliance, Ohio.

SALE OR TRADE—NRI Radio Serv. Course, NRI Radio & TV comm. course, Heathkit V-4 VTVM, NRI mod. 88 sig. gen., tubes, condensers, resistors, phones, misc. parts. Want enlarger and developing eqpt. or make offer. Stanley Kirka, 116 Oak St., Manchester, Conn.

FOR SALE—Howard Sam's vols. 1-6, sets 61, 62, 97-97A, best offer over $75; Silvertone man. vol. 1-3 $10; Zenith man. vol. 1, 2 $5; Supreme tube and set tester mod. 502 $30. Albert C. Hart, 207 N. Raymond St., Griffith, Ind.

FOR SALE OR TRADE—NRI radio-TV and comm. courses with all books and kits. Cash or trade for what have you. H. L. Logiudice, 89 Chapel St., East Hartford 8, Conn.

WANTED—Precision mod.E-200 sig. gen., E-400 TV-FM sweep gen. and ES-500A 5" oscilloscope. State cash price and cond. in first letter. R. Cooper Bailey, P. O. Box 112, Richmond 1, Va.

SELL OR TRADE—ARC-5 aircraft transmitter, 110-156 megacycles, crystal cont., like new. Samuel Nussbaum, 1083 E. 125 St., East Cleveland 8, Ohio.

FOR SALE—Sam's Photo Facts, 21 sets, 1-19 in binders, 30, 46; Supreme Most Often Needed 1948 Radio Diagrams $25, perf. cond. Markison Radio Service, Lakeville, Minn.

WANTED—Late model tube checker, Triplett, Hickok, Precision or Heathkit; tuned sig. tracer. Have 14" TV chassis, Mauser mod. 98, 6V. battery eliminator and Motorola 8 tube with push button for '50 Chev. Bernard Franklin, Hartsville, Tenn.

WANTED—Leeds & Northrup or Rubicon potentiometer. Will pay cash or swap. Francis Folger, 1632 S. 16th, Springfield, Ill.

WANTED—.30-.30, .38, or .30-.06 rifle in good cond. Will swap electronic gear, tubes, parts, transformers, etc. Robert H. Saunders, 12 School St., Salem, Mass.

FOR SALE—Espey 11 tube AM-FM chassis and 12" speaker, little used; best cash offer, COD. Will deliver in greater N. Y. and L. I. S. J. Smith, 11 Prospect St., Glen Head, L. I., N. Y.

SELL OR TRADE—Want Precision E-400, RCA TV calibrator WR-39C, RCA TV sweep gen. WR59B; have RCA TRK-5 and certified electrostatic TV sets, BC654A, BC454, Motorola 301 auto radio. Roy Cauble, 114-44 226th St., Cambria Hts. 11, N. Y.

SALE OR TRADE—Code practice keyer TG-10F, like new, with 15 tapes on metal spools; cabinet 11" x 22" x 15"; suff. volume for loud speaker or 40 phones. Want tube tester or small oscilloscope. Martin Sweets, 126 S. First St., Louisville, Ky.

FOR SALE—Victoreen portable beta-gamma survey meter (Geiger Counter) mod. 263B; in mahogany case, with built in shocks. Original cost $300; inst., case, and radioactive samples; also inst. and serv. man. $100. Robert L. Moothart, 422 E. Chapin, Cadillac, Mich.

FOR SALE—RCP mod. 800 tube and multitester, exc. cond. $25; Riders 1-10 $60; Speedex wire-stripper kit, 8 blades, like new $7.50. Send for comp. list. Carver Television Service, 177-42 Troutville Rd., Springfield Gdns. 13, N. Y.

WANTED—Rider vol. 1, 5-9, 11-15, 17-22 inc. vol. 1 and 8 on TV. State price and cond. Also tube tester, sig. tracer-gen. and a good scope; tubes, parts and tools. Frank Kesto, RFD 1, North Rose, N. Y.

WANTED—Thordarson T-19P64 plate transformer; Kenyon T-496 mod. transformer. Frank W. Jones, Gabbs, Nev.

WANTED—RCA type WV-95A master volt-ohmyst in good cond. This mod. needed for RCA TV test panel. Fleming's Radio & TV, P.O. Box 647, Rome, N. Y.

FOR SALE—Motorola car radio, del. mod., push button, '49 or '50 Chev; good cond. $45 or will trade for amateur equip. Bert Rex, 362 S. Third St., Lehighton, Pa.

FOR SALE—Pressure and vacuum gages calibrated in tenths, max. range 0-±3" of mercury; 4" x 4.75" x 6.5"; Hays Instrument Co. type R1BL, $15 ea. Also others. Joseph McDonald, 910 N. Seventh St., New Hyde Park, N. Y.

FOR SALE—SX 28-A rec. with speaker, never used, best offer; 6 ft. enclosed rack and panel 300 W. ham rig; 348-Q army rec. Make offer. Carlene Radio Television, 352 W. 115th St., Chicago 28, Ill.

FOR SALE—ATR converter, 6V DC input, 60 cy. 85W AC output $27.50; GE AC voltmeter 0-15, 150, 750 in mahogany case $32.75; 10" dynamic speaker, A1, $7.50. All FOB San Diego. R. C. Wilmarth, 927 9th Ave., San Diego 1, Calif.

FOR SALE—Hammarlund Super-Pro SP200-X with power supply and matching speaker all in table cabinets $150. P. D. Boothroyd, Box 143-G, RD 1, Sparta, N. J.

FOR SALE—Army sig. gen. mod. 1-222-A, like new, Triplett auto vibrator tester, mod. 1672, exc. $30; Rider Man. 1-5 abr. and 6-14, exc. cond. $85. Carl J. Visenti, 352 W. 115th St., Chicago 28, Ill.

WANTED—Will pay cash for good 5" oscilloscope, new or used. Jess B. Tatum, Box 416, Kershaw, S. C.

FOR SALE—Eicor dynamotor, 6V input and 600V at 250 MA output $20. Ralph E. Queen, 7136 Lone Oak St., Spartanburg, S. C.

FOR SALE—Masco combination Tape Recorder-radio-P.A. and phono amp., perf. cond., used less than 25 hrs.; compact, portable; 1 hr. continuous recording; cost $189.50; sell for best cash offer. John T. Moore, Box 63, Seneca, S. C.

TRADE—5BPI CRT 884 2 x 2 3800V trans., DC cond. input with load, 7500V .03 mfd cond oil inc. sockets and mask, like new. Trade for tubes, testers or SW rec. in repairable cond. or? James Di Chiera, 135 Main St., Westernport, Md.

OPPORTUNITY—Certified TV technician with complete lab., 7 yrs. exp. wishes partnership with someone entering TV or wanting to add TV to present business. Charles O. Luckett, 211 E. 8th Ave., Roselle, N. J.

SELL OR TRADE—Heath TS2 TV align. gen. factory calibrated, $32 or trade for Heath or Eico oscilloscope or good AM sig. gen. Inquiries from the Phila. area preferred. E. F. Barbour, 219 Harding Ave., Manoa, Havertown, Pa.

WANTED—Mobile converters (Gonset triband and two meter or equiv.) and .22 automatic target pistol. Have 832A's, 807W's, Gonset 10-11 conv. and misc. gear to swap, or cash. C. E. Ward, 16 Peltier Ave., New London, Conn.

FOR SALE—Rider vols. 1-13 $125 or best offer; very good cond. John Shewbrooks, Seneca Falls, N. Y., Gen. Del.

FOR SALE—2 two stage, 1 three stage VDX TV boosters for low channels, comp. with tubes; 2 $20 ea.; 1 $25. P. A. M. Sales Co., 1811 Cleveland Ave., N.W., Canton, Ohio.

FOR SALE—Large quantities amphenol connectors, AN and 97. Write for list of many types, quantities, and prices. Ken Palmer, 112 Lake Ave., Blasdell, N. Y.

FOR SALE OR TRADE—RCA Radiotron Rider's Man., 2767 pp.—comb. first 2 or 3 stan. vols., good cond. Want Grobs' Basic Television or make cash offer. Eugene B. Carman, 68 Homestead Ave., Bridgeport 5, Conn.

FOR SALE—RCA Audio Chanalyst with all cables and inst. book, like new $95 FOB, $25 down, bal. COD. Visual Education Service, 116 Newbury St., Boston, Mass.

FOR SALE—Thordarson T32W10 amp., 6 mos. old $25; DZ-2 rec., 15 KC to 1750 KC, 6 bands, needs slight repair, $12; 15" speaker (PM) like new $12. Want old band FM tuner for trade or cash. Charles Leigh, 162 Passaic St., Trenton 8, N. J.

FOR SALE—Majestic recorder, record player, radio comb. mod. 7YR753, cost $150, best offer. Want elec. motor for Sheldon Clock Corp. mod. K-200, mfg. by Int'l. Register Co, Chicago. Must be exact part; state price. Williamson Radio Service, Cooper, Tex.

FOR SALE—Sacrifice; Hickok 195B scope and 610A TV sweep at $290, prepaid. Orig. cost $388.50. Going out of TV business. J. J. Stone, 1933 Washington, St. Louis, Mo.

FOR SALE OR TRADE—RCA 7" scope WO-56A, $180. Hickok mod. 209A, VTVM $90. B & H Sportster 8mm camera with 2.5 lens, telephoto and wide angle lenses, case, $95. Want good xmtr, rcvr, printing press. Robert Du Fon, 4114 Northcote, East Chicago, Ind.

WANTED—Field strength meter, TV pattern bar gen.; Rider man. 5, 6. Give comp. information. J. M. Francis, 1660 Larchmont Ave., Lakewood 7, Ohio.

FOR SALE OR TRADE—RME 45 rec., good cond.; Webster mod. 80 wire recorder; Brush sound mirror tape recorder. T. B. Slade Jr., 1801 Selma Ave., Selma, Ala.

FOR SALE—Sams Photofacts, 1-116, in binders; Rider. Man. 8-14, all in exc. cond. C. Wayne Spencer, 2631 Bever Ave. SE, Cedar Rapids, Iowa.

FOR SALE OR SWAP—2 BC-645A trans.-rec.; PE101C dynamotor, 12V input with 50 ft. RG8U coax. cable, 2 T-17 carbon mikes, 2 antennas; conversions for 110V AC operation. Want good VTVM. Harry J. Senefeld, 2640 Bellevue Ave. No. 19, Cincinnati, Ohio.

FOR SALE OR TRADE—R.S. Dealer '43-'51; Service '43-'51; Radio Maintenance '46-'50. Want S20R Hallicrafter. A. F. Harriman, Erving, Mass.

FOR SALE OR TRADE—Mallory 6VT1 vibrator tester, like new $25; record player-changer, plays any radio $20; Vol. 2 Rider TV Man. $10; 6V dynamotor power supply $15. Want 35mm slide proj., cash, or battery aircraft rec. Jack A. Johnson, Delton, Mich.

FOR SALE—Rider Man. 10—17, like new $75; Precision E-200 sig. gen. $35; Silver-Vomax VOM; make offer. Wilbur A. Spain, 1 Sunset Rd., Hilton Village, Va.

FOR SALE—Jackson 652 audio oscillator, 20-20,000 CPS, like new $65; Hickok 203 VTVM, exc. cond. $50; both $110 prepaid. W. A. McCall, 3927 Fourth St., Wayne, Mich.

SWAP—Sig. gen., camera f4.5 lens, tubes, etc., for field strength meter, good cond. Orville V. Howell, Box 463, Mars Hill, N. C.

WANTED—Set of 40-meter band spread coils for HRO rec. W. C. Spence, 940 Bay St., N.E., St. Petersburg 2, Fla.

FOR SALE—630-TS chassis, like new; 3 x 4 ft. Norelco projection system. V. R. Parker, Lunenburg, Mass.

FOR SALE—Rider Man 1-15, all like new $125 FOB. Joseph W. Schebler, 2964 Kent Rd. E., Wantagh, N. Y.

FOR SALE—NRI electronic multitester with carrying case and test probes. Has special-built power pack for 115V 60 cycle line. Reliable tester in exc. cond.; $15 FOB Buffalo. N. Lieberger, 193 Windermere Blvd., Buffalo 23, N. Y.

FOR SALE—2 RCA wire recorder chassis comp. with tubes and motor, less case, cartridge (wire) and mike $20 ea. or $35 for both FOB St. Paul. L. J. Dynes, Kilkenny, Minnesota.

FOR SALE—Jensen mod. PM12C 12" wide range speaker $8; Rider Man. 11 $10; Williamson ultra hi-fi amp. with UTC linear stan. output transformer, 807 output $50. Money-back guarantee. L. F. Wagner, Box 143, Deansboro, N. Y.

SWAP—BC459A 7-9.1 mc and T19/ARC5-3.4 mc, both like new unconverted. Want 10M phone xmtr, mobile or fixed, or what have you. Also need S meter for SX25 rec. Lewis Daufman, 5213 Ventnor Ave., Ventnor, N. J.

WANTED—Hallicrafter or other comm. rec. QST 1940-'44; 1947-1951. Have Radio City 663-A electronic multitester, Simpson 260 tester, Rider Man. 13, 14, like new and power transformers, other items. B. S. Norkus, 3106 S. Llewellyn, Dallas 8, Tex.

FOR SALE—Rider Man. 6-14 like new, $90; Hickok VTVM, almost perf., $35; Hickok 53T tube tester mod. for late tubes, port. case $30. Want portable typewriter. A. Park, 452 Stevens Rd., Mt. View, Calif.

FOR SALE—Argus C3 camera, case, flashgun, Kodak 35mm enlarger, 8 x 10 easel, daylight tank, SS trays, timer, like new $100; BC454 rec. 3-6mc conv. for 110V $15. N. R. Levandosky, 321 Candry Terr., Baltimore 21, Md.

SALE OR SWAP—Channel 6, Yagi 2 bays, 16mm B & H film cleaner; B & H 16mm splicer, like new. Need motorcycle parts. G. D. Griffin, 222 Eddy St., Ithaca, N. Y.

FOR SALE—Port. Westinghouse AC voltmeter 0-600V; AC ammeter 0-5A; AC ammeter 0-10A; DC ammeter 0-10A; GE AC voltmeter 0-600V, or trade 2 meters for new oscilloscope. Alexander Radetzky, 392 10th St., Brooklyn 15, N. Y.

FOR SALE—Precision mod. 920 electronamic tube, battery and set tester used only part time, good cond., equipped with latest high-speed roller chart; shipped in orig. carton $75. C. Soest, 12092 Kilbourn, Detroit 5, Mich.

SELL OR TRADE—Excellent 10-11 mtr. mobile xmtr.; converter; BC-946 converted to 6V; single shot .22 pistol. Want BC-696, 120W modulator and .22 automatic or revolver. Harvey Van Erem, Box 1085, Jamestown, N. Dak.

WANTED—L.C.R. bridge in good cond., homemade or commercial, cash or trade. C. E. Junkins, RFD 1, Box 272, Holyoke, Mass.

FOR SALE—Circuit diagrams and data for individual mod. AM, FM, TV, record changer, chassis. $1 ea. cash or M. O. Raymond Conover, Stone Ridge, N. Y.

SELL OR SWAP—Inoperative all-wave German home rec.; 12" PM RCA speaker, radio and TV literature; x-tal mike, like new; Royal port. typewriter; auto fog lamps. E. Lind, 686 Georgia Ave., Brooklyn 7, N. Y.

FOR SALE—Two-wheel mobile sound trailer. Provides comm. over ½ mile area. Entirely portable; inc. power plant, mike, amplifier, loudspeaker and air heads. Orig. $5,000, now $495. W. A. Jones, 12 E. Lombard St., Baltimore 2, Md.

FOR SALE—McMurdo-Silver AM-FM sig. gen., net $116, asking $65; used very little. Raymond L. Wozniak, 126 Abington Rd., Rochester 9, N. Y.

WANTED—Stromberg-Carlson mod. 505 or 515 FM rec. covering obsolete FM band. State price and cond. George Kinkade, 1211 Market St., Wilmington, Del.

SALE OR TRADE—BC459A $15; BC455 $10; DM32A $1; QST Jan. '37 to Jan. '49, one binder $35; Triplett 2400 VOM $25. Want BC348 or 224. State price, etc. M. Marshall, 455 Washington Av., Dumont, N. J.

FOR SALE—12" Transvision TV with cabinet $35; Janette rotary conv. type C13 $25; Eico mod. 533 port. multitester $18; Precision E200C $40; Supreme oscilloscope mod. 660 $110; Rider TV Man 1-5 $15 ea. A. Bagatta, 180 Central Ave., Brooklyn, N. Y.

FOR SALE—Rider Man. 3-6; Gernsback 1-2; radio text books, antique tubes, parts. Priced low for quick sale. R. C. Gether, 4545 N. Bartlett Ave., Milwaukee 11, Wis.

FOR SALE—SCR522 trans.-rcvr., like new; with tubes; can be put on 2 meters without much conversion. First $55 takes it. You pay shipping. John Zachazewski, 27 Day Ave., Northampton, Mass.

WANTED—Hickok mod. 156 or 156A traceometer in new cond., reas. Paul Capito, 637 W. 21 St., Erie, Pa.

SWAP—Elgin 21 jewel RR watch; comp. ICS radio servicing course; Duro home workshop comp.; all items in exc. cond. Want radio test equipment. Robert Garrison, 2018 Helen Rd., Concord, Calif.

WANTED—IRC resistor cabinets, plastic or metal; neon signs any type; 2 lamp 40W fluor. fixtures; metal stock cabinets. Dependable Radio and Television Service, 3509 Rossville Blvd., Chattanooga, Tenn.

FOR SALE—Philco 7050 tube tester $20. Radios: Ford '49 $35, '51 $45; Pontiac '50 $45. Emerson '49 proj. console TV, good cond. $175; Steemelectric port. heater $9; 500W autotransformer tapped 110 to 220 $15. J. Conrad, 12908 Lorain, Cleveland 11, Ohio.

FOR SALE OR TRADE—NRI Service Man. No. 2 $10; NRI tester No. 1175-B $30; BC-946-B $20. Want tubes, tuning head for 1949 Plym. car. N. J. Nelson, 3037 First Ave. S, Minneapolis, Minn.

FOR SALE—BC-312 with matching speaker converted to AC, less power supply $30. Leo Perlmutter, 61 Ravine Ave., Yonkers, N. Y.

FOR SALE—One set new hi-speed drills, No. 1-60, std. length $9. Eric Scholer, 209 Glengary Rd., Schenectady 4, N. Y.

TRADE—Lauson 3 hp aircooled outboard motor in orig. crate, lists for $145 FOB. Want radio and TV test equip.; Chicago area. J. Tortorice, 1751 Erie St., Chicago 22, Ill.

WANTED—Kits to wire. Will build anything described in "Capacitor." Quality workmanship guaranteed. Blue Grass Electronics, 355 N. Limestone, Lexington, Ky.

TRADE—Precision electric welder, with hood and electrodes, also Astatic AT-1 TV booster for ½ to 1 hp 117V AC motors. Vick Radio Service, P.O. Box 216, Kershaw, S. C.

SWAP—Sewing machine, Emerson table model radio for Sam's Photofacts or ? S. J. Berichat, 98 Southside, Hastings-on-Hudson, N. Y.

FOR SALE—Hallicrafter S-38A; perf. for novices or SWL's; exc. cond., $39 takes it. Laurence Weiner, 3316 Grand Ave., Detroit 6, Mich.

FOR SALE—PE103, never used, comp., $18; SCR522 with tubes, exc. cond. $29; 100 ft. Rg 8/u $7.45. Ray Shahan, Rt 1, Burton, Wash.

SWAP—120 bass accordion and case, like new and guar. for Allied or Presto overhead, dual speed recorder. Alexander Matos, 1825 Church Ave., Bklyn, N. Y.

SWAP—¾ hp Briggs-Stratton motor, good cond., for VOM or tube tester in working cond. E. M. Brown, 2929 Washington Ave., Terre Haute, Ind.

WANTED—Good wire recorder, typewriter and home movie equipment. Joseph M. Malak, Center and Sperry roads, Chesterland, Ohio.

WANTED—6AE6 tube, new or good used. Sadler Radio, Clayton, New Mex.

FOR SALE OR SWAP—Tube tester; sig. gen.; condenser tester; Simpson ohm-volt tester; all late models, perf. cond. What have you? Alvin Koplin, Ottertail, Minn.

FOR SALE—Norelco proj. unit, perf. cond. with two spare proj. tubes $50 or will sell comp. with RCA 630 10" rec. $100 takes all. Carl B. Risser, 347 N. Broad St., Lititz, Pa.

WANTED—Schematic for army surplus transmitter mod. TU6B. Richard Teeft, 239 Roslyn St., Buffalo 15, N. Y.

FOR SALE OR TRADE—Feiler electronic stethoscope mod. T5-3A; electronic converter mod. 307. Want amplifier-tube checker, sig. gen., or what have you? W. J. Merritt, Bx 236, North Miami, Okla.

FOR SALE—Precision 10-54 mutual conductance tube and set tester; Heathkit 1952 oscilloscope and VTVM, both recently wired; Precision 200-C sig. gen., all exc. cond. Locascio, 8561 66th Rd., Forest Hills 74, N. Y.

WANTED—Instruction man. or schematic of Super-Pro mod. 110, army type. State price. Louis Rosenberger, 7608 Old Battle Grove Rd., Box 219, Baltimore 22, Md.

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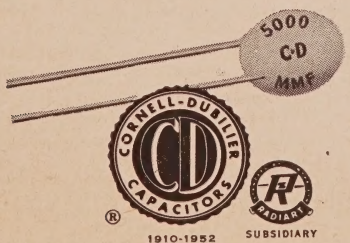

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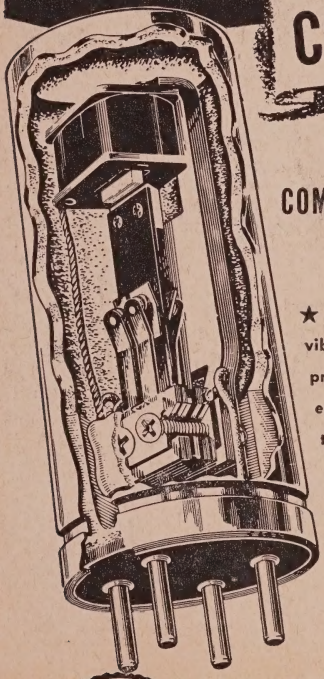

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